

PATENT SPECIFICATION

NO DRAWINGS

959,190



Date of Application and filing Complete Specification: Oct. 17, 1960.

No. 35474/60.

Application made in United States of America (No. 37027) on June 20, 1960.

Complete Specification Published: May 27, 1964.

© Crown Copyright 1964.

Index at acceptance:—A2 C(12, 14, 15)

International Classification:—A 24 b

COMPLETE SPECIFICATION

Process of Treating and improving Tobacco

We, IMPERIAL TOBACCO COMPANY OF CANADA LIMITED, a company organised under the laws of Canada, whose full post office address is 3810 St. Antoine Street, Montreal 30, Quebec, Canada, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a new process for treating tobacco which, while retaining the good manufacturing characteristics of the tobacco and yielding cigarettes of good smoking qualities, produces a lessening of the tar and nicotine content of its smoke.

There have been several statistical studies made on cigarette smoking which indicate that there may be a relationship between smoking and health. In addition, certain effects of smoking have been attributed to nicotine and other smoke constituents such as aldehydes and volatile bases.

A reduction of the nicotine and of the tar forming properties of tobacco by special prior treatment of the tobacco would help to substantially reduce the amount of smoke formed.

Several processes for treating tobacco have been proposed but most involve several steps and are difficult to incorporate into the regular processing of tobacco for cigarette manufacturing. More recently a one-step process has been proposed pertaining to a room temperature counter-current, rapid and partial extraction of tobacco ingredients with organic, non-inflammable solvents of boiling point above 50°C exemplified by halogenated hydrocarbons such as carbon tetrachloride.

The present invention comprises a process for treating tobacco having a normal moisture content which comprises subjecting said tobacco in its normal moisture content state to a non-pressurised extraction with a hot non-polar solvent as herein defined which results in the original nicotine content of the tobacco being reduced and the extraction

from the tobacco of not more than 7% of its weight and substantial quantities of the tobacco constituents which form respectively the nicotine and tar content of tobacco smoke without substantially changing the physical characteristics of the said tobacco.

The term hot non-polar solvent used herein means a non-polar solvent at or above 35°C.

The invention thus pertains to a process of extraction from tobacco of normal moisture content of certain tobacco ingredients involving hot non-polar solvents (such as normal-hexane, toluene, methylene chloride, etc.) rapid or slow, depending on the solvent used, in such a manner as to remove anything up to 7% of the weight of tobacco to provide a substantially physically unchanged tobacco which can be readily reconditioned to a normal moisture content and processed under normal manufacturing conditions to yield a regular type of cigarette of good smoking qualities without impairment of taste or aroma but yielding decreased tar and nicotine in its smoke.

This is achieved by continuously passing solvent through the tobacco or by covering the tobacco with solvent followed by removal and replenishing at suitable intervals until the rate of extraction has decreased to below practical limits and then removing excess solvent and returning the tobacco to a normal moisture content by passing a stream of moist air over the treated tobacco.

More specifically, cut tobacco at a regular moisture content is placed in a cotton bag into an extractor which can be drained by appropriate connections into a pot of a still from which solvent can be distilled into a reservoir and thence returned to the extractor.

The solvent can be normal hexane which is added hot to the tobacco until the latter is completely covered. A high temperature of 62—65°C is maintained throughout and the solvent is allowed to remain in contact with the tobacco for four hours after which it is

drained into the pot of the still. New solvent is added to cover the tobacco and the extraction continued while the removed extraction solution is distilled and the recovered solvent collected in the reservoir. The process of extraction is repeated with varying periods each over an hour long until the drained solvent is colourless and an aliquot reduced to dryness indicates that the rate of extraction has remained practically constant from the previous run. The tobacco is well drained and flushed with air to remove the bulk of residual solvent. It is then spread out in thin layers on cloth screens and a current of moist air blown over the tobacco to remove all traces of solvent and to provide sufficient moisture so that it is ready for subsequent normal factory processing.

The following is a typical example of a process carried out in an extraction treatment of tobacco:

A quantity of a typical cut blend of flue-cured tobaccos ready for manufacturing was mixed thoroughly and 60 lbs. were removed for extraction and another 60 lbs. were retained as a control.

The extraction was carried out by packing the 60 lbs. of tobacco in a cotton bag and placing it in a large drum used as a receiver in a large scale still. The tobacco was covered with 200 litres of distilled hot n-hexane (62—65°C) and the solvent drained and replaced with equal quantities of freshly distilled heated n-hexane at intervals of 4, 4, 4, 2, 2 and 2 hours. After 18 hours, the rate of extraction had remained practically constant and represented less than 0.1% of the original weight of tobacco. The extraction was considered complete for practical purposes and a yield of 3.5% to over 4.0% (based on dry weight of tobacco) was obtained.

The solvent was drained off completely and the tobacco air dried until free of most of the solvent and then spread out in thin layers in a moist air stream to completely remove the solvent and to return the tobacco to a normal moisture content.

The following Table 1 shows a step-by-step progress in the above experiment:

TABLE 1

Hot n-hexane extraction of flue-cured cut tobacco

Tobacco		Extraction period hours	Volume of Solvent	Wt. of Extract gm.	% yield (Wet Basis)	% yield (Dry Basis)
Weight	% Moisture					
60 lbs.	14%	4	200 l.	500	1.83	
(2730 gm.)		4	"	320	1.17	
		4	"	160	0.59	
		2	"	80	0.29	
		2	"	20	0.07	
		2	"	16	0.06	
Total		18		1096	4.01	4.7

A nicotine content comparison was then made between the extracted and the control tobaccos which showed the control tobacco to have 1.68% nicotine content and the extracted tobacco taken from the identical mixture to have 1.50% nicotine content, a reduction of 10.7%.

A further similar extraction was made with an equal amount of a similar tobacco mixture under substantially similar conditions. A comparison with an equal quantity of a control tobacco taken from the identical mixture showed the control tobacco to have

1.70% nicotine content and the extracted tobacco to have 1.51%, a reduction of 11.2%.

The above examples are by way of illustration only of a particular process under specified conditions but are not intended to be in any way a limitation except insofar as they are limited by the scope of the appended claims.

The time of extraction may be modified to obtain a lesser or greater extract as desired. The use of different non-polar solvents will to a large degree determine the optimum temperature and extraction times.

5 The extraction process can be adapted to a counter-current process whereby the solvent is passed continuously through the tobacco to remove extractables and the tobacco then taken out of the bath and dried and reconditioned by any available commercial method.

10 The tobacco extracted in the above manner does not differ significantly in appearance or feel or require different processing from non-treated tobacco. The cigarettes containing extracted tobacco have substantially the same smoking qualities as non-treated tobacco cigarettes. The nicotine content of the tobacco

15 is reduced by this process and the tar and nicotine contents of the cigarette smoke are also reduced as indicated in the following table.

TABLE IV

Solvent	Temp. of Extraction	% Nicotine in Tobacco			Nicotine in Smoke (Mg/cigt)			Whole tar in smoke (Mg/cigt)			
		% Extract	Before Extraction	After Extraction	% Reduction	Before Extraction	After Extraction	% Reduction	Before Extraction	After Extraction	% Reduction
N-Hexane	62—65°C	4.01%	1.68	1.50	10.7	2.27	1.76	26.4	27.8	19.9	28.4
Toluene	80—85°C	3.31%	1.95	1.08	44.6	2.43	1.47	39.6	28.9	21.6	25.6

20 Other non-polar solvents have been used in accordance with the invention for extracting tobacco, for example, methylenechloride as well as toluene and n-hexane by different processes or extraction times or with

25 different volumes of solvent. The extraction process, however, always removes a low portion of the tobacco and yields a treated tobacco which has not lost its manufacturing qualities.

30 The following are further examples of treatments by different processes, extraction times and temperatures, including the use of one other solvent, namely, methylenechloride.

Solvent	Method	Temperature	% yield of extract
methylene chloride	Soxhlet	35—38° C.	6.5

400 gm. of ground tobacco (10.7% moisture) extracted in Soxhlet at 35—38°C until solvent colourless to obtain above yield.

Solvent	Method	Temperature	% yield of extract
Toluene	Circulation	50—60° C.	3.39

Toluene extraction at 50—60° C. by recycling solvent through the tobacco with renewal of solvent at intervals (i.e. continuously passing solvent through the tobacco)

Tobacco		Extraction period in hours	Volume of solvent	Weight of extract gm.	% yield (wet basis)	% yield (dry basis)
Weight	% Moisture					
100 gm.	10.9	1	1 liter	1.894	1.89	
		2	1 „	0.672	0.67	
		2	1 „	0.452	0.45	
Total		5	3 „	3.018	3.02	3.39

- 5 Although the present examples have been used with cut or ground tobacco, the same or similar processes may be carried out on leaf, strip or lamina tobacco with similar results. These tobaccos may have a higher
10 or lower moisture content than the cut tobacco.

WHAT WE CLAIM IS:—

1. A process for treating tobacco having a normal moisture content which comprises
15 subjecting said tobacco in its normal moisture content state to a non-pressurised extraction with a hot non-polar solvent as herein defined which results in the original nicotine content of the tobacco being reduced and
20 the extraction from the tobacco of not more than 7% of its weight and substantial quantities of the tobacco constituents which form respectively the nicotine and tar content of tobacco smoke without substantially
25 changing the physical characteristics of the said tobacco.
2. A process as claimed in claim 1, where the tobacco is subjected to extraction with a non-polar solvent at a temperature not lower
30 than 50°C.
3. A process as claimed in claim 1 or 2,

where the non-polar solvent is passed continuously through the tobacco.

4. A process as claimed in claim 1 or 2, where the tobacco is immersed successively
35 in a plurality of baths of a non-polar solvent.

5. A process as claimed in claim 1 or 2, comprising adding a non-polar solvent to the tobacco until it is completely covered, maintaining the solvent in contact with the tobacco
40 for a predetermined period to extract moisture and tar forming properties therefrom, draining the solvent and then successively repeating the extraction process with approximately equal quantities of fresh solvent
45 for predetermined intervals until a yield of extract of over 3.5% (based on dry weight of the tobacco) is obtained.

6. A process as claimed in any of the preceding claims which is followed by the step
50 of removing the solvent from the treated tobacco and then passing a moist current of air over the said tobacco to return its normal moisture content thereto.

7. A process as claimed in any of the preceding claims, where the non-polar solvent
55 used is normal Hexane.

8. A process as claimed in any of claims

1 to 6 inclusive, where the non-polar solvent used is Toluene.

5 9. A process as claimed in claim 1, where the non-polar solvent used is methylene chloride.

10 10. A process as claimed in claim 7 where the normal Hexane is maintained at a temperature of 62° to 65° throughout the extraction process.

11. A process as claimed in claim 8, where the Toluene is maintained at a temperature

of 80° to 85° throughout the extraction process.

12. A process for treating tobacco substantially as herein described.

13. Tobacco when treated by a process according to any of the preceding claims.

BROMHEAD & CO.,
Chartered Patent Agents,
St. Paul's Chambers,
19—23 Ludgate Hill,
London, E.C.4.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press
(Leamington) Ltd.—1964. Published by The Patent Office, 25 Southampton Buildings,
London, W.C.2, from which copies may be obtained.